



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/626,128

07/21/2003

Fenglian Chang

DP-308948

9072

22851

7590

03/15/2006

DELPHI TECHNOLOGIES, INC.

M/C 480-410-202

PO BOX 5052

TROY, MI 48007

EXAMINER

BELL, BRUCE F

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 03/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/626,128

Applicant(s)

CHANG ET AL.

Examiner

Bruce F. Bell

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-17 is/are allowed.
- 6) ☒ Claim(s) 18 and 21 is/are rejected.
- 7) ☒ Claim(s) 19 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1/28/04; 7/21/03
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 18 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasei et al (6413397) in combination with Inoue et al (2002/0011410) and Wang et al (2002/0108871).

Hasei et al discloses a NO<sub>x</sub> sensor having a platinum-ruthenium-gold alloy as the sensing electrode. The NO<sub>x</sub> sensor has a sensing electrode and a reference electrode on each side of a solid electrolyte. See example 1 and Table 3.

Hasei et al does not disclose a heater on a side of the second electrode in thermal communication with the cell.

Inoue et al discloses the use of heaters on both sides of a gas sensor and is used to heat the elements to a predetermined working temperature, so that the sensitivity of the gas sensor is maintained. See para[0060]. Example 11 also shows the use of a Pt-Au alloy being used in a gas sensor for detecting Nitrogen monoxide, where the sensor is heated. The Au content was found to be about 4.1% when the total content of Au and Pt in the main electrode portion was taken as 100% by weight, when the electrodes were formed using a Pt-Au (1% by weight) alloy.

Wang et al discloses both an NOx cell and an EMF cell, where the EMF cell is between the NOx cell and the heater and the heater is connected adjacent the EMF cell through an insulating layer. See Figure 1 and para [0018-0020]. Wang et al also discloses that various electrodes can be used and that materials such as platinum and gold can be used as well as alloys. See para [0022].

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though the prior art of Hasei et al does not disclose the heater, it is well known in the art to use heaters in such sensing devices for the purpose of heating the elements in order to achieve increased sensitivity as shown in Inoue et al and in Wang et al. The prior art of Inoue et al further shows that the surface gold concentration is greater than the bulk gold concentration as shown by way of Example 11 where 1% by wt gold in the Pt-Au alloy, yields a surface concentration of 4.1% on the main electrode portion. Therefore, the prior art of Hasei et al in combination with Inoue et al and Wang et al render the applicants instant invention obvious for the reasons set forth above.

***Allowable Subject Matter***

3. Claims 1-17 and 19-20 are allowable over the prior art.
4. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest a method of forming an electrode by combining a platinum and gold precursors and forming an electrode ink that is fired to form the electrode and then treating the electrode in an atmosphere

having 500 ppm oxygen or less for a time sufficient to produce a surface gold concentration of greater than or equal to 6 times a bulk gold concentration in the electrode. A platinum-gold alloy electrode having a bulk gold concentration of between 0.2-1% based on the total weight of the Pt-Au alloy and an exposed surface gold concentration of between 5-25 wt% based on the total weight of the Pt-Au alloy at the surface of the electrode and wherein the surface gold concentration extends about 50 nm to 400 nm into the electrode is also not taught and/or suggested. A sensor having a first electrode of a Pt-Au alloy having a surface gold concentration of 8-20 wt% based on the total weight of the Pt-Au alloy at the surface is also not taught or suggested.

5. Claims 19 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1746

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BFB  
March 13, 2006

  
Bruce F. Bell  
Primary Examiner  
Art Unit 1746